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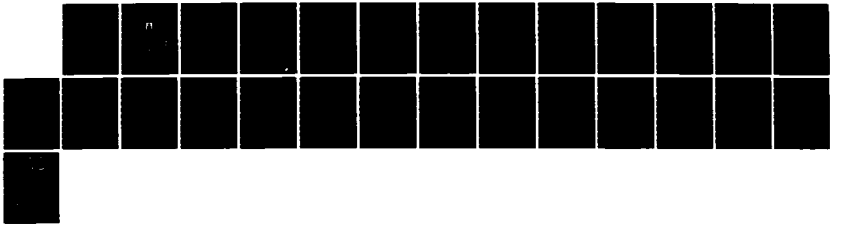

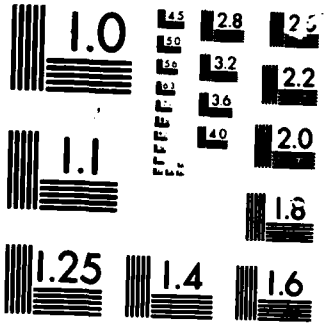

MICROCOPY RESOLUTION TEST CHART

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FTD-ID(RS)T-0208-86

AD-A166 206

FOREIGN TECHNOLOGY DIVISION

DATA TRANSMISSION SYSTEMS CIRCUITS AND EXCHANGE PARAMETERS ON THE C3 INTERFACE IN THE CASE OF THE PARALLEL INPUT-OUTPUT OF DISCRETE INFORMATION

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EDITED TRANSLATION

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DATA TRANSMISSION SYSTEMS CIRCUITS AND EXCHANGE PARAMETERS ON THE C3 INTERFACE IN THE CASE OF THE PARALLEL INPUT-OUTPUT OF DISCRETE INFORMATION

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere.
When written as ё in Russian, transliterate as yë or ë.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	$\sinh^{-1}$
cos	cos	ch	cosh	arc ch	$\cosh^{-1}$
tg	tan	th	tanh	arc th	$\tanh^{-1}$
ctg	cot	cth	coth	arc cth	$\coth^{-1}$
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
lg	log

GRAPHICS DISCLAIMER

All figures, graphics, tables, equations, etc. merged into this translation were extracted from the best quality copy available.

A-1

UDK 621.394.41/.423.001.8(083.74) Group P85

State Standard of the USSR

Data Transmission Systems
Circuits and exchange parameters on the C3 interface in the case of the parallel input-output of discrete information

GOST 18146-72

By decree of the State Committee of Standards of the USSR Council of Ministers No 1809 of 28 September the effective period is established

from 1/1 1974
to 1/1 1979

Noncompliance to the standard is punishable by law

The present standard extends to interface circuits between terminal data equipment (OOD) and data transmission equipment (APD), containing an error protection device (UZO), in the case of parallel character-by-character input-output of data and the radial method of information exchange.

The standard establishes the nomenclature of interface circuits, the electrical parameters of the signals sent by way of these circuits, and the technical requirements. Instructions for the selction of interface circuits and connectors are given in appendices 1, 2.

The standard is applicable to APD of the simplex, semiduplex and duplex types.

The standard is applicable only to cases of short connecting cables between data terminal equipment and data transmission equipment. The length of the connecting cables is limited by the electrical parameters of the circuits, defined in section 2 of this standard.

The present standard does not extend to APD which make use of the parallel character-by-character transmission of data over channels of communication.

1. Nomenclature of interface circuits

1.1. Interface circuits.

1.1.1. Circuit 1 - Protective grounding

This circuit should be connected electrically with the housing of the device or equipment. Provisions should be made for the possibility of connecting this circuit with local grounding.

1.1.2. Circuit 2 - Signal grounding or common return conductor

This circuit establishes the common potential between the data transmission equipment and the data terminal equipment. Inside the data transmission equipment the circuit should terminate in one point, and the possibility should be provided for connecting it with circuit 1 by a jumper inside the device. The jumper should be installed or removed in accordance with the requirements of the existing rules, or for cutting down the interferences which are induced in the electronic circuits of the equipment.

1.1.3. Circuit 3 - Call indicator

Direction: from the data transmission equipment.

Signals sent by way of this circuit indicate if the the data transmission equipment has received the call signal.

The state "Connected" indicates that the call signal is being received.

The state "Disconnected" indicates that the call signal is not being received.

1.1.4. Circuit 4 - OOD ready.

Direction: to the data transmission equipment.

The signals sent by way of this circuit control the hooking up to the line or disconnection from the line of the signal conversion device.

The state "Connected" indicates that the data terminal equipment is ready for operation, it prepares the data transmission equipment for hooking up to the line of the signal conversion device, and also maintains the established connection.

The state "Disconnected" obliges the data transmission equipment to be disconnected from the line of the signal conversion device after the transmission of data is completed, earlier than the data obtained from the data terminal equipment.

1.1.5. Circuit 5 - APD ready.

Direction: from the data transmission equipment.

The signals sent by way of this circuit indicate the readiness of the data transmission equipment for operation.

The state "Connected" indicates that the signal conversion device is hooked up to the line and that the data transmission equipment is ready for exchange of other signals of control with the data terminal equipment.

The state "Disconnected" indicates that the data transmission equipment is not ready for operation.

1.1.6. Circuit 6 - Switching of the rate of data transmission.

Direction: to the data transmission equipment.

The signals in this circuit are used for switching the rate of transmission of data in the case of synchronous equipment, having two rates, or for switching the range of rates of data transmission in the case of asynchronous equipment, having two ranges of rates.

The state "Connected" compels the switching to the upper rate or the upper range of rates.

The state "Disconnected" compels the switching to the lower rate or the lower range of rates.

1.1.7. Circuit 7 - OOD source ready.

Direction: to data transmission equipment.

The signals sent by way of this circuit indicate the readiness of the data terminal equipment to transmit data to the transmitter of the data transmission equipment.

The state "Connected" indicates that the data terminal equipment is ready to issue data to the transmitter of the data transmission equipment.

The state "Disconnected" indicates that the data terminal equipment is not ready to issue data to the data transmission equipment.

1.1.8. Circuit 8 - APD transmitter ready.

Direction: from the data transmission equipment.

The signals transmitted by way of this circuit indicate the readiness of the transmitter of the data transmission equipment to receive data from the data terminal equipmnet and to issue them to the data transmission channel.

The state "Connected" indicates that the transmitter of the data

transmission equipment is ready to receive data of the data terminal equipment and transmit them to the data transmission channel.

The state "Disocnnected" indicates that the transmitter of the data transmission equipment is not ready to receive data from the data terminal equipment.

1.1.9. Circuit 9 - Control of the APD transmitter.

Direction: from the data transmission equipment.

The signals sent by way of this circuit indicate whether or not the transmitter of the data transmission equipment is ready to receive the next data character from the data terminal equipment.

The state "Connected" indicates the readiness of the data transmission equipment to receive the next data character from the data terminal equipment.

The state "Disconnected" indicates that the data transmission equipment is not ready for receiving the next character, but received the previous data character.

1.1.10. Circuit 10 - Control of the OOD source.

Direction: to the data transmission equipment.

The signals sent by way of this circuit indicate how the transmitter of the data transmission equipment should perceive the state of circuits 12-19 (Data of OOD source).

The state "Connected" indicates that in circuits 12-19 the data character is displayed.

The state "Disconnected" indicates that the signals in circuits 12-19 should be disregarded by the data transmission equipment.

1.1.11. Circuit 11 - Errors of APD transmitter.

Direction: from data transmission equipment.

The signals sent by way of this circuit indicate whether or not an error is detected in the data character which was received by the data transmission equipment from the data terminal equipment.

The state "Connected" indicates that the transmitter of the data transmission equipment has detected an error in the data character received from the data terminal equipment.

The state "Disconnected" indicates the absence of any error.

1.1.12. Circuits 12-19. Data of the OOD source.

Direction: to data transmission equipment.

The combination of signals sent by way of these circuits corresponds to the code combination of the character of the transmitted data.

The state of the circuit "Connected" corresponds to the presence in this circuit of a data bit with the logical state "1".

The state of the circuit "Disconnected" corresponds to the presence in this circuit of a data bit with the logical state "0".

The data from the data terminal equipment are transmitted over circuits 12-19, whereupon circuit 12 always carries the least significant character, and the remaining circuits carry data in an increasing order of significance. The data character can contain any number of bits - from 1 to 8. The unused circuits following the last least significant bit of data should be maintained in the state "Disconnected."

1.1.13. Circuit 20 - Check bit of the OOD source.

Direction: to the data transmission equipment.

Signals sent by way of this circuit are used for checking the correctness of conveying the data character from the data terminal equipment into the transmitter of the data transmission equipment.

The state "Connected" indicates that the sum of the logical states of circuits 12-19 (Data of OOD source) modulo 2 is odd.

The state "Disconnected" indicates that the sum of the logical states of circuits 12-19 (Data of OOD source) modulo 2 is even.

1.1.14. Circuit 21 - Recipient of OOD ready.

Direction: to the data transmission equipment.

Signals transmitted by way of this circuit indicate if the data terminal equipment is ready to receive data from the data transmission equipment.

The state "Connected" indicates that the data terminal equipment is ready to receive data from the data transmission equipment.

The state "Disconnected" indicates that the data terminal equipment is not ready to receive data.

1.1.15. Circuit 22 - APD receiver ready.

Direction: from the data transmission equipment.

The signals sent by way of this circuit indicate if the ADP receiver is ready to receive data from the data transmission channel and to issue the data received to the data terminal equipment.

The state "Connected" indicates that the data transmission equipment is ready to receive data from the data transmission channel and to

issue the data to the data terminal equipment.

The state "Disconnected" indicates that the data transmission equipment is not ready to receive data from the data transmission channel and to issue the data to the data terminal equipment.

1.1.16. Circuit 23 - Control of the OOD recipient.

Direction: to the data transmission equipment.

The signals sent by way of this circuit indicate if the data terminal equipment is ready to accept the next data character from the data transmission equipment.

The state "Connected" indicates the readiness of the data terminal equipment to accept the next data character from the data transmission equipment.

The state "Disconnected" indicates that the data terminal equipment is not ready to accept the next character from the data transmission equipment, but has accepted the preceding character.

1.1.17. Circuit 24 - Control of the APD receiver.

Direction: from the data transmission equipment.

The signals sent by way of this circuit indicate how the recipient of the data terminal equipment should perceive the state of circuits 26-33 (Data of APD receiver).

The state "Connected" indicates that in circuits 26-33 the data character is displayed.

The state "Disconnected" indicates that the signals in circuits 26-33 should be disregarded by the data terminal equipment.

1.1.18. Circuit 25 - Error from OOD recipient.

Direction: to the data transmission equipment.

The signals sent by way of this circuit indicate whether or not an error is detected in the data character received by the data terminal equipment from the receiver of the data transmission equipment.

The state "Connected" indicates that the data terminal equipment detected an error in the data character which was received.

The state "Disconnected " indicates the absence of any error.

1.1.19. Circuits 26-33 - Data of the APD receiver.

Direction: from the data transmission equipment.

The combination of signals sent by way of these circuits corresponds to the code combination of the character of the data received.

The state of the circuit "Connected" corresponds to the presence in this circuit of a data bit with the logical state "1".

The state of the circuit "Disconnected" corresponds to the presence in this circuit of a data bit with the logical state "0".

Data from the data transmission equipment are transmitted by way of circuits 26-33, whereupon circuit 26 always carries the least significant character bit, and the remaining circuits carry data in an increasing order of significance.

The data character can contain any number of bits - from 1 to 8. The unused circuits following the last greatest significant data bit should be maintained in the state "Disconnected."

1.1.20. Circuit 34 - Check bit of the APD receiver.

Direction: from the data transmission equipment.

The signals sent by way of this circuit are used for control of the correctness of conveying the data received from the data transmission equipment to the data terminal equipment.

The state "Connected" indicates that the sum of logical states of circuits 26-33 (Data of APD receiver) modulo 2 is odd.

The state "Disconnected" indicates that the sum of logical states of circuits 26-33 (Data of APD receiver) modulo 2 is even.

1.1.21. Circuit 35 - Emergency signalling.

Direction: from the data transmission equipment.

Signals sent by way of this circuit are used for signalling about irreparable disruptions in data transmission.

The state "Connected" indicates irreparable disruptions in the transmission of data.

The state "Disconnected" indicates that irreparable disruptions in the transmission of data are absent.

1.1.22. Circuit 36 - Control of OOD data.

Direction: to the data transmission equipment.

The signals sent by way of this circuit indicate if it is necessary to take into account in the data transmission equipment the state of circuit 20 (Check bit of the OOD source).

The state "Connected" indicates the necessity of taking into account the state of circuit 20.

The state "Disconnected" indicates that it is not necessary to take into account the state of circuit 20.

1.1.23. circuit 37 - Control of APD data.

Direction: from the data transmission equipment.

Signals sent by way of this circuit indicate if it is necessary to take into account in the data terminal equipment the state of circuit 34 (Check bit of the APD receiver).

The state "Connected" indicates the necessity for taking into account the state of circuit 34.

The state "Disconnected" indicates that it is not necessary to take into account the state of circuit 34.

1.2. Categories of interface circuits.

1.2.1. The interface circuits can be broken down into four categories: grounding, data, control and check of data (see Table).

Number of circuit	Name of circuit	Grounding	Data		Control		Check	
1	2	3	4	5	6	7	8	9
1	Protective grounding	x						
2	Signal grounding or common return conductor	x						
3	Call indicator				x			
4	OOD ready					x		
5	APD ready				x			
6	Switching of rate of data transmission					x		
7	OOD source ready					x		
8	APD transmitter ready				x			
9	Control of APD transmitter				x			
10	Control of OOD source					x		
11	Error of APD transmitter						x	
12-19	Data of OOD source			x				
20	Check bit of OOD source							x
21	OOD recipient ready					x		
22	APD receiver ready				x			
23	Control of OOD recipient					x		
24	Control of APD receiver				x			
25	Error from OOD recipient							x
26-33	Data of APD receiver		x					
34	Check bit of APD receiver						x	
35	Emergency signalling						x	
36	Control of OOD data							x
37	Control of APD data						x	

x - indicator of circuit category.
4, 6, 8 - from data transmission equipment;
5, 7, 9 - to data transmission equipment.

2. Electrical parameters of the interface circuits.

The electrical parameters given in this section pertain to all the interface circuits. The signal duration in the circuits should be no less than 50 μs. The exchange is realized over nonsymmetric circuits by bipolar signals.

Note. In technically substantiated cases circuits 12-19 and 26-33 should be symmetric and shielded.

2.1. Equivalent circuit.

2.1.1. The layout shown in Figure 1 extends to interface circuits of the following categories: data, control and check. This layout does not depend on the mutual position of the generator and the load; the generator can be located in the data terminal equipment, and the load - in the data transmission equipment, and vice versa.

2.1.2. The overall resistance of the generator (load) includes the resistance of the cable from the side of the generator (load) to the point of the interface.

2.2. Load.

2.2.1. The equivalent layout for measurement of overall resistance of the load is given in Figure 2.

2.2.2. The overall resistance of the load in respect to direct current should be within the limits of from 3000 to 7000 ohms.

2.2.3. With a measurement voltage $U_м$ from 3 to 15 V the current, measured using the layout in Figure 2, should be within the following limits:

$$|I_{min}| = \left|\frac{U_н - U_м}{R_{max}}\right| \text{ min;}$$

$$|I_{max}| = \left|\frac{U_н + U_м}{R_{min}}\right| \text{ max.}$$

Figure 3 gives the graphs of dependence of current on measurement voltage $U_м$. If the measured current is found within the limits, stipulated for the given value of $U_м$ (Figure 3), then a conclusion can be made concerning the conformity of the load in the circuit of interface to the requirements of this standard.

Equivalent layout of an interface circuit.

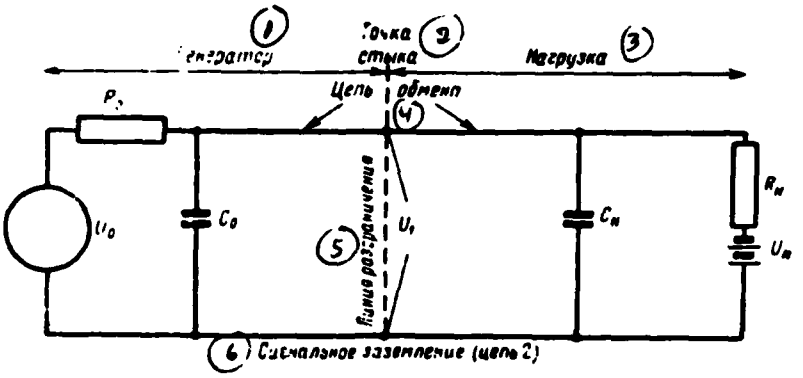

Figure 1.

U_0 - voltage of generator in the no-load mode; R_0 - internal resistance of generator in respect to direct current, measured in the interface point; C_0 - overall shunting capacitance from the side of the generator; U_1 - voltage in the interface point relative to circuit 2 (signal grounding); C_H - overall shunting capacitance from the side of the load, measured in the interface point; R_H - resistance of load in respect to direct current, measured in the interface point; U_H - voltage on the load with an opened circuit.

Key: (1) Generator; (2) Interface point; (3) Load; (4) Exchange circuit; (5) Delimiting line; (6) Signal grounding (circuit 2).

For example, with U_H equal to 10 V the values of the measured current are found within the limits from 1.1 to 4 mA. Consequently the conclusion can be made concerning the conformity of the value of load resistance to the norm.

2.2.4. The voltage on the load in the case of an opened circuit U_H should not exceed 2 V in absolute magnitude.

2.2.5. The value of capacitance, shunting the resistance of the load and measured in the interface point, should not exceed 2500 pF.

Note. It is permitted to increase the value of capacitance, shunting the load, in the case of a signal duration in the circuits greater than 50 μs and under the condition of fulfillment of the remaining requirements of section 2 of this standard.

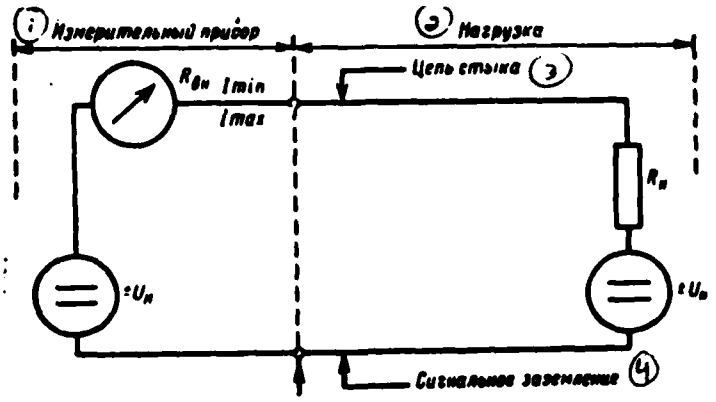

Figure 2.

$U_м$ - voltage, used for measurement of load resistance; I_{min} - minimal value of measured current; I_{max} - maximum value of measured current; $R_{вн}$ - internal resistance of the measuring device.

Note. The internal resistance of the measuring device $R_{вн}$ should be no more than 100 ohms.

Key: (1) Measuring device; (2) Load; (3) Interface circuit. (4) Signal grounding.

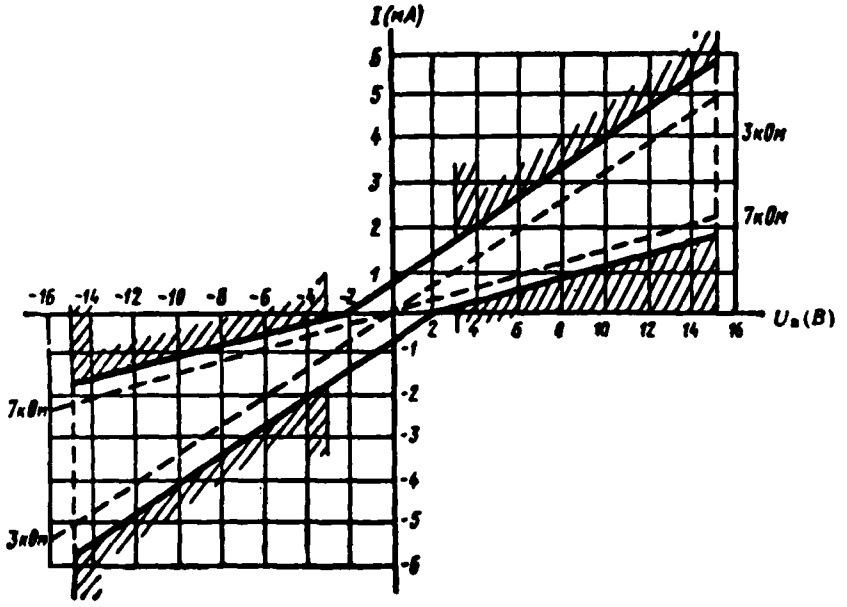

Figure 3. Graph of the dependence of current $I_{min, max}$ on the measuring voltage $U_м$.

2.2.6. To avoid the appearance of peaks of voltage in the exchange circuits the reactive component of load resistance should not be inductive. The load in the circuit should be calculated for operation with an input signal in the range of values of voltages defined in p. 2.3.

2.3. Generator.

2.3.1. The generator in any interface circuit should be calculated for the condition of running without load and short circuiting between it and other circuits, including generators and loads; in this case there should be no damages in the generator itself or in the device which is connected with it.

2.3.2. The voltage of the generator on no-load U_0 in any interface circuit should not exceed 15 V in absolute magnitude.

2.3.3. The values of resistance R_0 and capacitance C_0 of the interface circuits from the side of the generator are not standardized, however, the values of R_0 and C_0 should be selected with a calculation that short circuiting between any two interface circuits would cause the appearance of no more than 0.5 A.

2.3.4. If the voltage on the load in the case of an opened circuit U_H is equal to zero, then the voltage U_1 in the interface point should be within the limits of from 5 to 15 V in absolute magnitude (of positive or negative polarity) at any value of load resistance R_H within the limits of 3000 to 7000 ohms.

2.3.5. The value of shunting capacitance from the side of the generator C_0 of the interface circuits is not standardized. However, the generator should operate with a total capacitance from the side of the generator C_0 and capacitance from the side of the load C_H no higher than 2500 pF.

2.4 Signal levels.

2.4.1. For all the interface circuits of the category "data" (circuits 12-19 and 26-33) and circuits 20 (Check bit of the OOD source) and 34 (Check bit of the APD receiver) it is established that the signal is found in the state of binary "1" when the voltage U_1 in the interface circuit, measured in the interface point, is more negative than minus 3 V, and in the state of binary "0" when the voltage U_1 is more positive than plus 3 V.

2.4.2. The circuits of control, circuits 25 (Error from OOD recipient), 11 (Error of APD transmitter), 35 (Emergency signalling), 37 (Control

of APD data), 36 (Control of OOD data) are considered set in the state "Connected" when the voltage U_l is more positive than plus 3 V, and set in the state "Disconnected" when the voltage U_l is more negative than minus 3 V.

2.4.3. The range of voltages between the values of plus 3V and minus 3 V is defined as the transition zone. The state of a signal in the circuit is not clearly defined when the voltage U_l is found in this zone. An exception to this definiation is described in p. 2.6.

2.5. Transition zone.

2.5.1. The parameters given below for signals which are transmitted through the interface point (without considering external inductions) should be ensured by a load, answering to the requirements indicated in p. 2.2.

2.5.2. The signals formed by the generator on the interface, falling into the transition zone, should cross it up to the moment of achievement of the opposite state of the signal. They should not return to the transition zone up to the appearance of a significant change of signal.

2.5.3. The load of the interface circuit should not perceive changes of signal polarity until the signal is found in the transition zone.

2.5.4. For the data, control and check circuits the necessary time of passage of the signal of the transition zone in the course of a change of state should be no more than 1 ms or 3% of the minimal duration of the signal in the corresponding circuit (a minimal value should be accepted).

2.5.5. The maximum value of instantaneous rate of change of voltage should not be more than 30 V in 1 μs.

2.6. Detection of malfunctions.

2.6.1. Circuits 4 (OOD ready) and 5 (APD ready), if they are used, can serve for detection of conditions of a break in electric power in devices connected through the interface, or a break in the connecting cable.

In the case of breaks in electric power the overall resistance in each of these circuits on the side of the generator should be more than 300 ohms, when the measurement voltage (of positive or negative polarity) is no more than 2 V in absolute magnitude in respect to circuit 2 (Signal grounding).

The load of these circuits should perceive the condition of a break in power or a break in the connecting cable of the interface as the state "Disconnected."

3. Technical requirements

3.1. Interaction of circuits 4 and 5.

3.1.1. The signals in circuit 5 (APD ready) should be responses to the signals in circuit 4.

3.1.2. Circuit 4 after transition to the state "Disconnected" cannot be switched again to the state "Connected" until the data transmission equipment switches circuit 5 to the state "Disconnected."

3.1.3. In the case of using separate communication channels circuit 4 may be absent - this means that the circuit is constantly found in the state "Connected."

3.1.4. In the case of joint operation of the data transmission equipment and the data terminal equipment the following conditions should be fulfilled:

a) if circuit 5 is found in the state "Disconnected" the data terminal equipment should not be considered with the state of the remaining circuits, originating from the data transmission equipment. Exceptions are circuits 3 (Call indicator) and 35 (Emergency signalling);

b) if circuit 4 is found in the state "Disconnected," the data transmission equipment should not be considered with the state of the remaining circuits, originating from the data terminal equipment.

3.1.5. The state "Connected" in circuits 4 and 5 testify to the fact that the signals in the remaining interface circuits, originating from the data terminal equipment or the data transmission equipment, are reliable.

The state "Disconnected" in circuits 4 and 5 should not block the action of circuits 3 and 35.

3.2. Interaction of circuits 7, 8, 9, 10, 11, 12-19, 20 and 36.

3.2.1. If circuit 8 (APD transmitter ready) is not found in the state "Connected," then the data terminal equipment should not take into account the state of circuits 9 (Control of APD transmitter) and 11 (Error of APD transmitter).

3.2.2. If circuit 7 (OOD source ready) is not found in the state "Connected," then the data transmission equipment should not take into account the state of circuits:

10 (Control of OOD source);

12-19 (Data of OOD source);

20 (Check bit of OOD source);

36 (Control of OOD data).

3.2.3. Request for transmission of data from the data terminal equipment is realized by the transfer of circuit 7 (OOD source ready) to the state "Connected."

3.2.4. Circuit 7 (OOD source ready) should be shifted to the state "Disconnected" only when circuit 10 (Control of OOD source) is found in the state "Disconnected." If circuit 7 is switched to the state "Disconnected" at any other time, the data may be transmitted with an error.

3.2.5. Circuit 8 (APD transmitter ready) should be switched to the state "Disconnected" only when circuit 9 (Control of APD transmitter) is found in the state "Disconnected." If circuit 8 is switched to the state "Disconnected" at any other time, then the data may be transmitted with an error.

3.2.6. Switching of circuit 8 to the state "Disconnected" if circuit 7 is found in the state "Connected" can have the result that not all of the data from the data terminal equipment will be transmitted.

3.2.7. Switching of circuit 9 (Control of APD transmitter) to the state "Connected" means that the data transmission equipment is ready to receive the data character from the data terminal equipment.

3.2.8. Circuit 10 (Control of OOD source) should be switched to the state "Connected" only after transition to the state "Connected" of circuit 9 (Control of APD transmitter).

3.2.9. Circuit 9 (Control of APD transmitter) should switch to the state "Disconnected" only after the data transmission equipment receives the data character from the data terminal equipment.

3.2.10. Circuit 9 (Control of APD transmitter) should be maintained by the data transmission equipment in the state "Disconnected" until it detects the state "Disconnected" of circuit 10 (Control of OOD source) and the data transmission equipment is ready for receiving the following character from the data terminal equipment.

3.2.11. Circuit 10 (Control of OOD source) should switch to the state "Disconnected" only after the data source detects the switching of circuit 9 (Control of APD transmitter) to the state "Disconnected."
3.2.12. Circuit 10 (Control of OOD source) should remain in the state "Disconnected" until the data source detects the state "Connected" of circuit 9 (Control of APD transmitter).
3.2.13. Circuit 11 (Error of APD transmitter) is set in the state "Connected" if the data transmission equipment, while making a check of the transmitted data, detects an error in the data character. The state of circuit 11 is taken into account by the data terminal equipment after the switching of circuit 9 (Control of APD transmitter) to the state "Connected."
3.2.14. Circuit 11 (Error of APD transmitter) is set by the data transmission equipment in the state "Disconnected" if there is no error in the transmitted data or the check of the transmitted data is not made.
3.2.15. Circuit 20 (Check bit of the OOD source) and circuits 12-19 (Data of OOD source) should be transferred to the state, corresponding to the data character until circuit 10 (Control of the OOD source) switches to the state "Connected." Circuit 10 and circuits 2-19 should be maintained in an unchanged state until circuit 9 (Control of APD transmitter) switches to the state "Disconnected."
3.2.16. Circuit 36 (Check of OOD data) should not change state when circuit 10 (Control of OOD source) is found in the state "Connected."
3.3. Interaction of circuits 21, 22, 23, 24, 25, 26-33, 34 and 37.
3.3.1. If circuit 21 (Recipient of OOD ready) is not found in the state "Connected", then the data transmission equipment should not take into account the state of circuit 23 (Control of OOD recipient) and circuit 25 (Error of OOD recipient).
3.3.2. If circuit 22 (APD receiver ready) is not found in the state "Connected," then the data terminal equipment should not take into account the state of the following circuits:

24 (Control of APD receiver);
26-33 (Data of APD receiver);
34 (Check bit of APD receiver);
37 (Check of APD receiver).

3.3.3. The data terminal equipment can realize the request for the reception of data by the switching of circuit 21 (Recipient of OOD ready) to the state "Connected."

3.3.4. Circuit 22 (APD receiver ready) should be switched to the state "Disconnected" only when circuit 24 (Control of APD receiver) is found in the state "Disconnected." If circuit 22 switches to the state "Disconnected" at any other time the data may be received in the data terminal equipment with an error.

3.3.5. Circuit 21 (Recipient of OOD ready) should be switched to the state "Disconnected" only when circuit 23 (Control of OOD recipient) is found in the state "Disconnected." If circuit 21 switches to the state "Disconnected" at any other time, then the data will be received with an error.

3.3.6. The switching of circuit 22 (APD receiver ready) to the state "Disconnected", if circuit 21 (OOD recipient ready) is found in the state "Connected," can have the result that not all the data from the data transmission equipment will be received by the data terminal equipment.

3.3.7. Switching of circuit 23 (Control of OOD recipient) to the state "Connected" means that the data terminal equipment is ready to receive the data character from the data transmission equipment.

3.3.8. Circuit 24 (Control of APD receiver) should be switched to the state "Connected" only after switching to the state "Connected" of circuit 23 (Control of OOD recipient).

3.3.9. Circuit 23 (Control of OOD recipient) should switch to the state "Disconnected" only after acceptance by the data terminal equipment of the data character from the data transmission equipment.

3.3.10. Circuit 23 (Control of OOD recipient) should be maintained by the data terminal equipment in the state "Disconnected" until the recipient of the data terminal equipment detects the state "Disconnected" of circuit 24 (Control of APD receiver) and is ready for reception of the following data character from the data transmission equipment.

3.3.11. Circuit 24 (Control of APD receiver) should be switched to the state "Disconnected" only after the receiver of the data transmission equipment detects the transition of circuit 23 (Control of OOD recipient) into the state "Disconnected."

3.3.12. Circuit 24 (Control of APD receiver) should remain in the state "Disconnected" until the data transmission equipment detects the state "Connected" in circuit 23 (Control of OOD recipient).

3.3.13. Circuit 25 (Error from OOD recipient) is set by the data terminal equipment in the state "Connected" if it detects an error in the data character.

The state of circuit 25 is taken into account by the data transmission equipment after transition of circuit 23 (Control of OOD recipient) into the state "Connected."

3.3.14. Circuit 25 (Error from the OOD recipient) is set by the data terminal equipment in the state "Disconnected," if there are no errors in the data arriving from the data transmission equipment, or of the data are not checked.

3.3.15. Circuit 34 (Check bit of the APD receiver) and circuits 26-33 (Data of APD receiver) should be transferred to the states, corresponding to the data character until circuit 24 (Control of APD receiver) switches to the state "Connected."

Circuit 24 (Control of APD receiver) and circuits 26-33 (Data of APD receiver) should be maintained in the unchanged state until circuit 23 (Control of OOD recipient) switches to the state "Disconnected."

3.3.16. Circuit 37 (Check of APD data) should not change state, when circuit 24 (Control of APD receiver) is found in the state "Connected."

3.4. Circuits 3 and 35.

3.4.1. The action of circuit 3 (Call indicator) should not be limited or blocked by the condition of operation of any other interface circuit.

3.4.2. Transition of circuit 35 (Emergency signalling) to the state [illegible] should not be limited or blocked by the condition of operation of any other interface circuit.

3.4.3. After the switching of circuit 35 (Emergency signalling) to the state "Connected" the circuit should be locked in this state regardless of the state of any other interface circuit, except circuit 4 (OOD ready).

Transition of circuit 4 from the state "Disconnected" to the state "Connected" should lead to the unlocking of circuit 35. In this case, if the disruption in the transmission of data was eliminated, circuit 35 should switch to the state "Disconnected."

3.5. Diagram of interaction of circuits in the case of data exchange.

The diagram of interaction of the circuits in the case of data exchange is given in Figure 4.

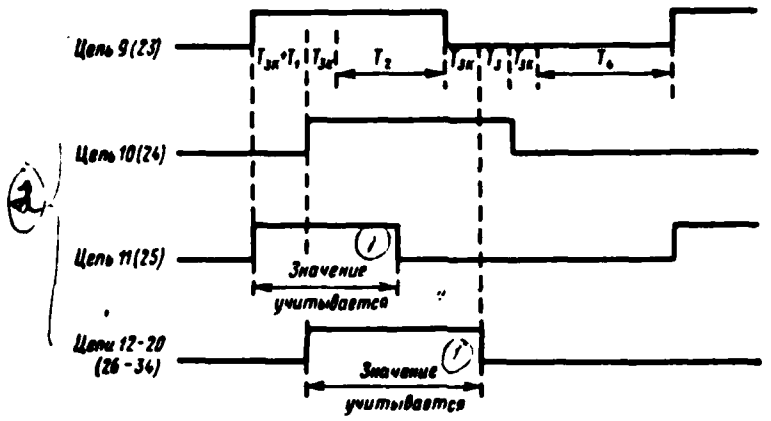

Figure 4.

The numbers of the circuits which pertain to the case of data transmission are indicated without parenthesis.

The number of circuits indicated in parenthesis pertain to the reception of data.

$T_{3к}$ - time of delay of signal in the cable; T_1, T_3 - time, corresponding to the high-speed action of the OOD data source (receiver of data APD), T_2, T_4 - time, corresponding to the high-speed action of the APD transmitter (recipient of data terminal equipment).

Key: (1) Value is taken into account; (2) Circuit .....

The time necessary for conveying of data character on the interface is defined as the sum

$$T_1 + T_2 + T_3 + T_4 + 4T_{3к}.$$

Appendix 1

Instructions for the selection of interface circuits

1. The interface circuits for a specific coupling of data terminal equipment with data transmission equipment should be selected from the nomenclature of circuits given in the table for this standard.

2. List of circuits for the C3 interface which are compulsory (O) and noncomp. (N) for use in simplex, semiduplex and duplex data transmission equipment is given in the table.

3. In special cases it is permitted to add additional circuits, the parameters of which should conform to the requirements of this standard.

Name of circuit	Number of circuit	Type of equipment			
		Simplex		Semi-duplex	Duplex
		Transmit.	Receiver		
1	2	3	4	5	6
Protective grounding	1	O	O	O	O
Signal grounding or common return conductor	2	O	O	O	O
Call indicator	3	N	N	N	N
OOD ready	4	O	O	O	O
APD ready	5	O	O	O	O
Switching of rate of data transmission	6	N	N	N	N
OOD source ready	7	N	-	O	N
APD transmitter ready	8	N	-	O	N
Control of APD transmitter	9	O	-	O	O
Control of OOD source	10	O	-	O	O
Error of APD transmitter	11	N	-	N	N
Data of OOD source	12-19	O	-	O	O
Check bit of OOD source	20	N	-	N	N
OOD recipient ready	21	-	N	O	N
APD receiver ready	22	-	N	O	N
Control of OOD recipient	23	-	O	O	O

Table (continued)

1	2	3	4	5	6
Control of APD receiver	24	-	O	O	O
Error from OOD recipient	25	-	N	N	N
Data of APD recipient	26-33	-	O	O	O
Check bit of APD receiver	34	-	N	N	N
Emergency signalling	35	N	N	N	N
Check of OOD data	36	N	-	N	N
Check of APD data	37	-	N	N	N

Appendix 2

Instructions on the selection of the connector and disposition of interface circuits.

1. The interface circuits should be distributed on the contacts of the connectors "Transmission" and "Reception." For the transmitter of simplex equipment of data transmission the connector "Transmission" should be provided, and for the receiver - "Reception." For semiduplex and duplex equipment both connectors should be provided.

2. The connectors "Transmission" and "Reception" should be identical and contain no less than 25 contacts.

3. The sequence of soldering the interface circuits in respect to the contacts of the connectors should conform to the table.

Sequence of arrangement of circuits	Number of interface circuit	
	"Transmission" connector	"Reception" connector
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	21
8	8	22
9	9	23
10	10	24
11	11	25
12	12	26
13	13	27
14	14	28
15	15	29
16	16	30
17	17	31
18	18	32
19	19	33
20	20	34
21	35	35
22	36	37

4. For connectors which have only a digital designation of contacts the sequence of arrangement of the circuits should correspond to an increase of the number of the contact.

For connectors which have a letter-digit designation of contacts, the sequence of groups by letters is set in alphabetical order, and inside the group - based on the increase of the digital number of the contact.

5. It is permitted to use contacts which are not the same in both connectors ("Transmission" and "Reception"). In this case the sequence of arrangement of the circuits should not be disrupted.

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